

## Business Implications of Integrated Product and Service Offerings

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### Abstract

This paper explores the business implications of Integrated Product and Service Offerings (IPSOs). The objective is to show examples of the business implications of IPSOs from a supplier's perspective, and to suggest specifications for supporting methods needed for such an industrial company. The paper is largely based on empirical case studies of 120 Swedish manufacturing companies of all sizes. Results from the case studies show that both small and large companies that conduct the transition towards IPSOs face several important strategic challenges, some of them associated with high risk.

### Keywords:

Product Service Systems (PSS), IPS<sup>2</sup>, methods, Integrated Product Service Engineering

## 1 INTRODUCTION

### 1.1 Challenges of integrating product and service

In the search for strategies toward higher competitiveness, a trend among manufacturing companies is to create value for their customers by offering complex system solutions consisting of combinations of hardware, software and services, tailored for the specific needs of the customer (e.g. Oliva and Kallenberg [1], Vargo and Lusch [2, 3]). These offerings are often referred to as Product Service Systems (PSS) (e.g. [4]), Industrial Product Service Systems (IPS<sup>2</sup>), or, as in this paper, Integrated Product and Service Offerings (IPSOs) [5].

First of all, the challenge in this field, namely the variety of business models and the strategies behind them, should be recognized (see Section 2). Tomiyama *et al.* [6] present this collection of varied types and discuss it in the context of design methodology, taking the example of washing clothes, which is broken down into utilizing/renting a washing machine, coin-operated laundry, laundry services, renting clothes, etc. Allmendinger and Lombreglia [7], on the other hand, classify the strategies of companies providing PSS into four types - a) embedded innovator, b) solutionist, c) aggregator, and d) synergist - through observing practices in various industries. This classification depends on the degrees of being product-centric, reliance on business partners and so on.

From an engineering viewpoint, one question in the industrial sectors concerned with this growing type of offer is how companies can find fruitful combinations of traditional product offerings with services that customers want and are prepared to pay for, that at the same time can be efficiently provided by the supplier, with sane risk-taking and long-term profit. Another important question is what kinds of parameters should be addressed to do so.

Previous research has attempted to answer these questions. For example, Morelli [8] argues that the design

of a PSS falls in a different domain than that of a traditional product. In addition, he states that the design discipline has no methodologies to operate in such domains, and proposes the use of envisioning with a scenario. Sakao and Shimomura [9], in the context of sustainable production and consumption, argue that a much larger framework than product design is needed, because the business model is ultimately changed; they suggest the use of disciplines such as engineering, marketing, and management. In other research [10], it has been argued that PSS clearly should involve several participants and new actors in its development process, and must consider company strategies (positions), organisational structures, and economic consequences, something that is further elaborated on and emphasized by Isaksson and Larsson *et al.* [11]. Sakao and Ölundh-Sandström *et al.* [10], as well as Isaksson and Larsson *et al.* [11], argue that further research is needed for these questions considering both economic, engineering design, and environmental consequences.

One important argument is that the shift in business models towards IPSOs implies a new mind-set and organising framework at the industrial company [1]. Vargo and Lusch [3] present the service-dominant logic, as opposed to the goods-dominant logic: "*The process of providing service for (and in conjunction with) another party in order to obtain reciprocal service, is the purpose of economic exchange*". Goods are seen as carriers of function instead of being the primary base for business. They [2] call for a natural shift from marketing theory and practice influenced by classical economics to a service-centred model influenced by "marketing as a social process", much in line with relationship marketing researchers Normann and Ramírez [12], Normann [13], Gummesson [14], and Grönroos [15]. Obviously, such a fundamental change of perspective opens new theoretical views on business models.

Although quite a lot of research has been carried out on PSS in the service marketing and environmental (eco-design) fields (e.g. [2, 3, 16]), it appears that economic and business implications, i.e. regarding offerings, IPSOs, and business models, have been less elaborated on so far.

## 1.2 Objective

The objective of this paper is to show some examples of the business implications of IPSOs from a supplier's perspective, and to suggest specifications for supporting methods needed for such an industrial company.

## 1.3 Method

The paper is mainly based on empirical case studies [17, 18] at Swedish manufacturing companies of different sizes. In total, 120 company case studies (58 small (10-50 employees), 3 medium (51-250 employees) and 59 large (>250 employees)) were conducted (size according to the European Union's definition [19]). Of the 120 companies, some have participated in more than one case study, and are therefore counted more than once. Some complementary studies have also been made at banks (especially for financial solutions) and pure service companies (for comparison and refinement of the issues to study).

The most-used data collection method in these studies has been qualitative research interviews [20]. The main purpose was to obtain a deeper understanding of the manufacturing company's current business and product development activities regarding IPSOs vs. traditional product sales. A second purpose was to investigate potential needs for methodological support for development of IPSOs [5, 21-23].

Some companies were studied in-depth during a long time period with several interviews carried out on site; others have been studied through interviews with company managers during meetings and workshops with several companies participating. Respondents were e.g. product and service developers, CEOs, and customers. In most cases, face-to-face interviews were recorded.

Question areas in the semi-structured interviews (for the purpose of this paper) were; *Number of IPSOs compared to total sales volume; Profitability for IPSOs vs. traditional sales; Customer's perceived value of IPSOs; Customer involvement in IPSO development; Contract forms; Supplier experiences of IPSOs (pros and cons); Uncertainty associated with IPSOs.*

Besides these question areas, other areas beyond the scope for this paper were touched upon, depending on the focus of each project.

In parallel to the studies above, surveys were also conducted in Sweden, Japan, Italy and Germany [24]. This study covers 34 companies, some of which are Swedish companies already included in the Swedish studies above.

## 2 KEY STRATEGIC ISSUES

The orientation towards IPSOs implies several important strategic implications for a supplier company, depending on its size and market position, customer demands and market characteristics. In this section, some of the most important issues found in the case studies will be scrutinized.

### 2.1 The role of company size and flexibility

The most commonly used company size classification [19] defines four company sizes - micro (<10 employees), small (10-49 employees), medium (50-249 employees) and large (>250 employees). The scope of this study did not include micro companies. However, based on the

analysis of the study's result, 50 employees were chosen as a relevant and appropriate landmark to discriminate how businesses based on IPSOs are achieved. For example, medium-sized companies have more in common with large companies regarding this issue than with small companies; therefore, companies with 50 employees or more henceforth referred to as "large companies".

One observation, seen both in small and large companies, was that customers in the same market moved at a different pace regarding IPSOs. While some customers demanded IPSOs from their suppliers, i.e. tailored "total care" solutions with customized delivered value and often with important buyer-supplier relationships, others preferred traditional standardized (catalogue) products. These results were also supported in studies by Day [25], who argues that not all customers are willing to have the kind of close relationship to a supplier that is usually required for IPSOs and who concludes "*both a product and a service-centred logic will co-exist in most markets*" [25]. This can have different consequences for small and large companies, as will be addressed in the following sections.

Our previous articles [24, 26] report that there are differences in providing IPSOs depending on the providers' sizes. Large or medium-sized companies relatively often regard the customer demands, increased competition, and gaining larger product profit as the driving forces, whilst small ones rarely do. More large and medium-sized companies include operators, maintenance, repairs, and take-back responsibility in the IPSO, while fewer small ones do. Also, the ownership of the physical products often belongs to small-sized providers, as opposed to the situation found in large and medium-sized companies. In addition, small companies more often design products specifically for the IPSO than do large and medium-sized ones.

### Large companies

Large supplier companies are organised with different functional units (departments), and thus tend to be less flexible and efficient when they begin a new type of business due to more rigid structures and higher overhead costs. Empirical results have shown that large companies often tend to create new organisational units in charge of activities linked to IPSOs. This approach both addresses internal organisation and the different customer demands on traditional products vs. IPSOs.

From the characteristics of large companies described at the beginning of this subsection, being large has both advantages and disadvantages for IPSOs. A major advantage is the ease to consolidate different elements to form a package of solutions, as they can more likely be supplied from their own company. Disadvantages include the difficulty (connected to organisational rigidity) to change the development processes and ownership styles established for traditional product sales business. In addition, it takes much effort to change the skills and mindset of employees, where e.g. some used to work only in the technical world. These problems originate from the organisational subdivisions of a company. Many companies, especially larger ones, are divided into different departments, each with its own budget to follow, and hence ownership of resources, tasks and results. In addition, the functions of employees are more specifically allocated.

Today's companies are in general organised for the traditional business logic, selling products. It is quite common especially in large companies that departments, e.g. product development, production, spare parts, and after-sales, act like independent companies within the

company. Each department is an independent profit centre with yield requirements - and with managers whose bonuses and reputations are often related to their results of fulfilling those yield requirements.

However, the traditional organisation has difficulties when switching to IPSOs. The new business logic as stated earlier implies that the focus moves from selling many products, spare parts, services etc. to instead providing an offering that reduces the need for products, spare parts, service etc. We have seen several examples of companies whose organisational structures conflict with their work with IPSOs. An example, seen in many companies, is related to spare parts. Spare parts are in traditional product sales often an important cash cow with high margins. However, when delivering IPSOs, the company itself becomes the major buyer of spare parts, and if the price models for spare parts remains unchanged (e.g. the internal spare part price is equal to that which customers pay), the cost for spare parts can jeopardize the entire company's IPSOs concept. Furthermore, for a spare part department, IPSOs often imply that their turnover and profit will decrease - something not often popular among the staff.

To conclude, when switching to IPSOs, it is important to evaluate the whole organisation in order to identify potential organisational obstacles that can jeopardize the IPSOs business, and thereafter adjust the organisation. In many cases, there are bonus systems connected to parameters related to the budget.

Another challenge is how to convince customers [22]. So far, a contract in the form of "profit sharing", where the company revenue is determined depending on the machine performance, does not seem so successful. The reasons include the accuracy of measurement and customer psychology. Here, the issue of "open books" is a key factor in the case of large companies as well.

### **Small companies**

Compared to the conditions in large companies, the two most significant differences are that the small company's transition into IPSOs is both easier, owing to more flexible organisation with fewer people involved, and done at higher risk, due to fewer financial and other resources. Many of the studied small industry companies have seen the potential, but, due to different reasons, have not fully realized it. In studies from 2002-2003, it was observed that some small companies had bundled traditional products with services into packaged "total solutions" that would solve the customers' problems; however, since the customers and the market were not prepared for this, many of them had to withdraw their offerings.

The empirical results illustrated early on the difficulty for a small company to make the transition. The advice for these companies was therefore not to risk their traditional business while moving into the direction of IPSOs. Other empirical evidence found that small companies, during a short period of time, reoriented their complete business towards system solutions instead of traditionally selling single units, this for the benefit of their customers, reduction of waste, and also to increase profit for the supplying small company. Profitability also varied in the studied IPSOs as compared to traditional offerings; it seemed to be connected with initial cost for the small company turning into an IPSOs supplier (see also [27]), but also with the contracts and the possibility to communicate delivered value. It was common in the cases studied that service was given away for free from the supplier, and interviewed managers said that this was "comme-il-faut" in their business and taken for granted by their customers. Yet others, who had started to charge customers for service, did this with little or no fuss at all

from the customer side. On the contrary, this clarified business conditions between the parties, and strengthened the supplier's position.

The results of the difference in customer demands for traditional products and IPSOs [25] were also a common answer from CEOs, both in the early and in the later case studies (2003-2008), although more and more suppliers look at IPSOs today, since more and more customers ask for them. However, for the small company it can be a tricky challenge to manage both a part of their market that has realized the advantage of total solutions, and other parts that have not. Not all customers are willing to have the kind of close relationship to a supplier that IPSOs usually require. This implies that even the small company needs to be prepared to offer both traditional products and IPSOs (in different customer-specific variants). The small company's flexibility to turn the whole organisation into ISPO also makes it difficult to uphold both lines of business simultaneously; this is the other side of the coin.

Often among the studied small companies, hesitation to change into IPSOs is due to risk-taking. To fulfil larger, often more complex ISPOs including e.g. financial, product development, analysis, training, support and maintenance services, it often requires a network of several companies. If the small company is the point of contract, it needs to manage a business network consisting of different parties for each customer offering. Moreover, as e.g. Gummesson [14] points out, these parties tend to become *partners*. When a small company takes on large and complex IPSOs, the risk for both buyer and supplier can be higher. If the supplier fails, it always comes down to the customer; if delivering an important part of customer operations, this can be costly. However, the opportunity to find skilled specialists in small companies for specific customer-tailored solutions at a low total cost can be attractive. On the other hand, choosing a small supplier increases possibilities to work closely, thereby limiting the risk-taking. For example, in the case of failure to deliver from the small supplier or its ISPO business network, such skilled specialists can be employed by the customer company or the supplier, or parts of its activities can be incorporated into the larger company. Nevertheless, these are tricky operations.

To manage risk when small companies take on large integrated product-service contracts requires careful and quite open negotiation about price and risk between the buyer and the supplier. It does not necessarily mean "open books", i.e. full visibility of the supplier's cost and price calculations, since this can make it difficult for the supplier to achieve profit margins. However, an open discussion of each party's specific contribution and strengths for the IPSO fulfilment is required. The customer should also be attentive to the network of partners that the small company is depends on. If the supplier fails due to partner companies, the loser in the end is always the customer.

### **2.2 Managing the risks and opportunities of IPSOs**

The research shows that when offering an IPSO, a new mindset for how to secure the economic growth of companies needs to be developed [1-3, 28]. In the Goods-Dominant logic [2, 3], the supplier's income is strongly connected to the sale of the physical product and from spare parts, incidental material, service and maintenance needed to keep it in serviceable condition. The distribution of income differs, from 100% on the initial product to more or less 100% on spare parts.

The case studies show that the key to new IPSO business models lie in whether the supplier is able to control the physical products during the pre-use, use and post-use phases. The take-back of used products

especially has an important impact on the business model [29], with possibilities for remanufacturing. Supplier control can be exercised e.g. through kept ownership, certified user training, or via service contracts. When the ownership stays with the supplier during the use phase, a third party, e.g. a leasing company, can be the legal owner in order to finance the physical parts. Increased control over the physical artefacts during the use phase means both opportunities and risks. Below are listed some of the identified examples where the supplier has opportunities to increase control over the physical part of IPSOs.

**Customer's perceived risk of ownership** – Many customers would prefer to not own non-core physical products for their business. Ownership means assets on the balance sheet, and lower total capital increases the profit/total capital ratio, which is an important key performance index. Another reason is that the customer needs change, and ownership reduces flexibility to change (depending on the form of leasing contract, which may be expensive to break in advance). Since the supplier takes over the risk, this can be a way to more rapidly introduce new technology; if the technology does not work, it is the supplier's problem and not the customer's. If the customer needs change, the supplier can have a clause that for a fee enables the customer to change or adjust the offering. A supplier has in general an easier time than a customer to find a new user for the non-needed products, and this is an advantage for the supplier. Toyota Material Handling Group, one of the world's leading forklift truck producers, benefits from this when they take back and trade their own or competitor's old forklift trucks.

Toyota Material Handling Group also focuses on customer-perceived risk of ownership, and uses this actively in their marketing when offering IPSOs. In their advertising they state:

"Don't buy trucks! It makes sense to use a fleet of trucks to facilitate efficient materials handling – but you don't have to own it to use it. Think about why you buy things. You might think about buying your home - it's an investment - and it will probably increase in value over time. You might want to own something that's extremely special, very rare, or has sentimental value. Or something you want to keep for yourself. **But why would you want to own a forklift truck?**

- What if your requirements change?
- What else could you do with the capital?
- What about peaks and troughs?
- What happens when it breaks down?
- What about disposal and environmental issues?
- What about knowing your costs in advance?

The risks of ownership – We manage them for you. (We can do it better and cheaper, it's our business). The fact is that trucks consume capital, lose value over time, can breakdown, need maintenance, and have to be disposed of one day. The ones you need today are probably not the ones you will need tomorrow because your requirements will change."

**Supplier access to physical products during the use-phase** – In the case of IPSOs, access to the physical product during the use-phase of the product is important for the supplier. There are several reasons for this.

1. Measure the use. This can be done in order to:
  - a. get a base of payment;
  - b. obtain information concerning need of maintenance;
  - c. gain control, if correctly used; and
  - d. improve the use (without upgrading), e.g. through better working procedures.

2. Perform maintenance.
3. Upgrade software or electronic hardware.
4. Replacement, e.g. to newer equipment.

Obviously, supplier access to the physical product can be delicate during the use phase for many reasons. Use measurements may be perceived as user surveillance, threatening personal integrity. Stops for maintenance, upgrading or replacement need to be avoided if the product is used in key activities, where customer revenue depends on run-time. From the customer perspective, any operator training due to such changes also must be avoided for cost and convenience reasons.

The customer may want to use the help of service providers other than the IPSO supplier in case of e.g. malfunction, especially when the IPSO is a part of a larger system. Altogether, this sets tough requirements on the supplier to be innovative both when it comes to technical solutions, e.g. for remote maintenance, knowledge about customer operations in order to minimize trouble in the use phase, and attractive maintenance contracts. Maintenance personnel or operators employed by the supplier at the customer site may be a solution. The argument is stronger if the supplier owns the product.

Another sometimes applicable solution that often forces the user to accept the supplier's access to physical products during use is through design and technical solutions, e.g. by making it complicated for the individual user to do their own maintenance. This can be done e.g. by requiring special service and maintenance equipment and tools, spare parts and consumables that only can be handled and offered by the supplier.

**Control over spare parts, service and maintenance** – OEM spare parts, service, and maintenance are crucial for the IPSO supplier. Otherwise, other suppliers' solutions may cause harm and danger to the use of the product. However, the difficulty lies in avoiding pirate copies (managed by patents, Intellectual Property Rights (IPRs), and laws), solutions close to the OEM suppliers from low-cost suppliers or local suppliers, which due to convenience or cost reasons may be the preferred choice of the customer. Building up the service organisation required to control the market may be costly; another solution is, again, innovative solutions that are difficult to copy, contracts, and customer relationships that foster the OEM supplier as the customer's first choice.

Rank Xerox is one of the more famous examples of IPSO suppliers that use this strategy. They have built up a system that provides control over spare parts, service and maintenance, and even have systems that can remote control customers' printers and conduct remote maintenance. Rank Xerox can also control and in advance send out service staff before any malfunction occurs. Furthermore, they have also built up a phone support system where the customer, in the simpler cases, acts as a remote service staff member instructed by the phone support centre staff.

**Customer dialogue** – The supplier's need for product control during the use phase both requires and increases the opportunity for the supplier to have a constant dialogue with the customer. However, this necessitates that the customer perceives the supplier as a strategic, key supplier, since the trend has been to reduce the total number of supplier contacts [25]. Generally, the supplier must be regarded as a solution provider, expressing customer gain in terms of increased customer profit or decreased cost [30], and if so, the supplier needs to pay careful attention to any signal of customer dissatisfaction. The alert supplier will probably be one of the first to know if something is wrong, or if the customer hesitates to abandon the IPSO, which provides an opportunity to

improve the existing offering or to offer something new. Furthermore, if the service and maintenance is done by the supplier, it enables a closer contact and dialogue with the users of the IPSO, i.e. several points of contact at the customer side. This can be an important source of information, e.g. from the operators, about how to improve the design, or how to further customize the IPSO in order to improve customer value.

According to several companies, during the use phase it is often easier to get a deeper understanding about the real needs and what the customer considers as real value. The customer's purchaser is not always fully initiated in all needs; this may imply that user of the IPSO does not get all their needs fulfilled. Furthermore, as stated by several companies, it is preferable that this dialogue is distinguished from traditional selling situations (i.e. no purchaser staff involved). This is because customers sometimes are more cautious e.g. to fully reveal their needs, since this may be a way for the supplier to increase the price.

**Control over the second-hand market** – When considering control over the second-hand market, it is important to remember that the focus in the IPSO concept is on providing functionality and customer value, regardless if this is performed by new or second-hand products. However, since the second-hand market exists for many products, several IPSO suppliers have experienced the crucial need to control or prevent their own second-hand market, but also often other suppliers' products. There are several reasons for this, the most frequently mentioned of which are presented below.

One reason often mentioned by suppliers is competition from companies specialized in trading with remanufactured or refurbished second-hand products (often the supplier's own products). Those remanufactured or refurbished second-hand products are often a potential and attractive alternative for the customer, and are often manifested in a significant pressure on prices. To prevent this, companies, e.g. Toyota Material Handling in Sweden, keep the ownership of the IPSO's ingoing products (no products go directly from customer to the second-hand market) and when providing IPSOs they often redeem the customers' old forklift trucks (even other brands).

A second reason, related to that above, is that the product's inherent value is often quite high, even though it is replaced by newer products. However, this value depends on the owner, the owner's knowledge about the product and the owner's ability to take advantage of this knowledge. For example, a Toyota forklift truck has a lower value for a warehouse owner than for Toyota Material Handling in Sweden. This is because the forklift truck manufacturer, which has knowledge about e.g. remanufacturing and refurbishment can find a new customer for the used truck or use it for spare parts. At the same time, if the supplier doesn't keep control over the second-hand market, companies may enter the market that built up the knowledge and have the ability to capitalize on this knowledge. Freebie" suppliers such as ink printer OEMs have experience with other companies which collect refills and resell the suppliers' own ink cartridges.

A third reason for control is that faulty remanufactured or refurbished products have negative influence on the customers' apprehension of the brand. Case studies have e.g. shown that the OEM logotype and identification information is not removed when other suppliers remanufacture their products and sell them on the second-hand market. In fact, this is beyond the OEMs control and risks serious bad-will.

**Material and component supply** – Related to previous discussion, it also implies that the supplier can build up

their own system for remanufacturing and refurbishment of used ingoing products and material. This can be an effective and efficient way to secure part of a company's own component and material supply. One example is a company that has developed a patent composite (recycled thermoplastic and wood fibers) that is recyclable, and which produces various products that they can take back and reduce the need for future materials. Another example of an offering is end plugs for paper bobbins. In short, the first time they sell a plug, they need to produce the composite; in following times, they can reuse the material (only adding some new composite). This implies that their cost for material is significantly reduced.

**Win-win opportunities when the supplier takes over ownership** – If the customer only pays for the accessibility and use of the physical product, and the supplier maintains the control, ownership or responsibility of the equipment during its use, income from spare parts, incidental materials, service and maintenance become internalized at the supplier. In other words, instead of contributing to the profit, as a cost for the supplier it burdens it. This needs to be specified in contracts, so that the supplier has access to the physical equipment, and also can control how it is being used, e.g. certified training programs for customer service, maintenance, and operator personnel. This has several important implications for the IPSO:

- Focus on reducing the need for spare parts, incidental materials, service and maintenance e.g. through changed design to reduce Service and maintenance requirements, and if needed, design for ease, effectiveness and efficiency
- Focus on product life-cycle issues: a desire to use ingoing material, hardware, software, and other components, spare parts and incidental materials as effective and efficient as possible.

### 2.3 The role of the market position

This research has identified aspects to consider related to the market position, further described below.

**Risk of lower sales volume or quantity** – Market share measures are usually based on the number of produced and sold products, or the company's turnover as a share of total market size. Several IPSO suppliers have highlighted that this can be a problem when focusing on changes from producing and selling a large number of goods to instead delivering more customer value with less ingoing physical products, spare parts, incidental materials, etc. Fewer produced and sold products can, in the short term, decrease sales volume, since the supplier can deliver the same or more value at a lower initial price for the customer. When the customer chooses an IPSO, according to the service-dominant logic [2, 3], payment is instead distributed along the use phase. Important key performance indices may be affected, and may change the company's market position.

**Risk of lower profit margin** – Another problem is when the provider of an IPSO manages a network of several suppliers contributing to the complete offering [3, 16, 31], or when the IPSO includes taking over the responsibility for parts of customers' operations [1], e.g. of a warehouse, and requires co-ordination with other suppliers. If the customer prefers one-point-of contract, this increases the supplier's turnover. On the other hand, if the margin is low on these subcontractor contributions, this implies a lower profit margin for the IPSO supplier.

**Effects on company brand** – IPSOs imply for many companies a major change, and the business logic is quite different from that of traditional sales. Several companies have mentioned problems explaining their IPSOs to their customers. However, it seems that market

leaders or companies with leading brands can easier introduce new IPSO concepts to their customers. One important factor is most likely the credibility that comes with the leading position and the brand image that gives. A comment on this is given in [2], where the term “brand equity” is suggested to be replaced by “customer equity”, i.e. if the Service-Dominant Logic super-ordinates the Goods-Dominant Logic, customer relationships will be more important assets to a company than its brand.

**Access to information about competitors’ products –** Remanufacturing, or merely return of used products, gives the IPSO company possibilities to gain knowledge about competitor products if any used equipment is accepted, regardless of manufacturer. This should be a large threat to manufacturers not offering then return of used products [29].

## 2.4 Contract types

Developing IPSOs results in a form of contracts. We have seen in practice different forms of contracts than seen in traditional product sales, which include the following types. Note that these are neither mutually exclusive nor collectively exhaustive. In addition, it should be noted that these types are categories for contracts, and different from the well-known classification of services, i.e. product-oriented services, use-oriented services, and result-oriented services [32].

- **Insurance contracts:** The customer pays a fee to the supplier for obtaining the function that the supplier provides. This insurance guarantees access to the *function* instead of the specific equipment (a unique, identified object), which is usually the case in rental or financial leasing.
- **Rental contract:** The most common rental contract is for apartments. The customer pays a fee to the supplier for using the equipment. Ownership always stays with the supplier. In the case of TMHG Sweden, the rental contract is presented in three different offerings, with more or less service included.
- **Financial leasing:** A financial service where the customer pays an interest rate. At the end of a leasing contract period the customer usually owns the product, or has the right to buy it at very low price (terminal value).
- **Lease and take back:** The contract stipulates that the supplier owns the hardware equipment at the end of the leasing period. Until then, the equipment is handled as if it was owned by the customer.
- **Pay-per-use:** Customers are charged according to an amount in a predefined scale in this type of contract. This form usually requires an electronic-counting device that records the use of the hardware equipment for the supplier or a manual control (e.g. car rental, taxi).
- **Pay-per-hardware unit:** This contract type is similar to traditional hardware selling, but the difference is that service is included in the price of the hardware unit.
- **Pay-per-service unit:** This contract type is similar to traditional service selling (per hour or per specified service), but the difference is that hardware is included in the price of the service.
- **Performance-based contract:** This contract type includes payment for the supplier based on the performance of the offerings at the customer. It can be associated with “profit sharing”. ESCOs (Energy Service Companies) close this type of contract particularly targeting the energy efficiency of customers.
- **Demonstration contract:** This is a combination of a performance-based contract and a before-hand demonstration period. In the period of demonstration,

the company provides “trial” service, where the supplier takes some risk. This type is meaningful unless customers agree to the contents in a contract before their own experience.

## 2.5 Being solutionist vs. less risky

The supplier’s fulfilment of complex offerings often requires several sub-suppliers. In such a situation it was observed, in line with previous research on business networks [7, 14, 25, 31], that the customer prefers one contract. This means that the sales volume for the IPSO supplier increases, but not necessarily the profit margin – in fact it lies in the customer’s interest that these transaction costs are low. On the other hand, the supplier takes a risk if the guaranteed function is provided through a network of partners and subcontractors, which should be rewarded through some kind of risk fee.

Figure 1 is a schematic illustration of the vertical business relationship between the customer, the supplier (IPSO provider) and its partners for the specific offering in a business network. There may be several sub-tiers, i.e. suppliers to the supplier’s suppliers and partners.

In the figure, the customer has one point of contract with one of the suppliers, referred to as the IPSO provider. The companies in the network provide key subsystems or key services to the IPSO, and are referred to as partners, terminology indicating the importance of a close relationship for the IPSO provider with these companies [14], while the 2<sup>nd</sup> to nth tier suppliers are more of the component type of suppliers. Contractual business relations are indicated with arrows, i.e. delivery of service or goods from supplier to buyer and remuneration (payment) in the other direction.

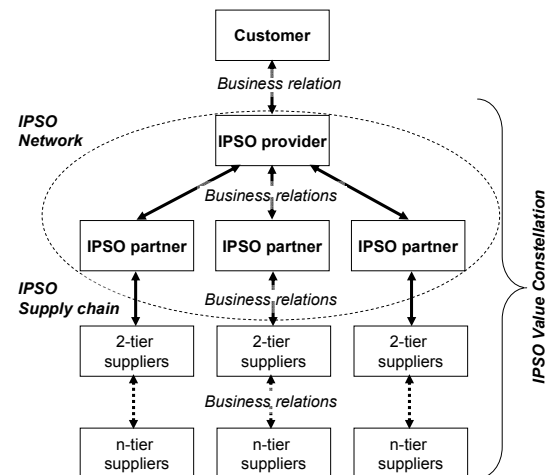


Figure 1. Schematic illustration of an IPSO business network.

It should be noted that integrating sub-suppliers as one package and focusing on their core competence can be contradictory. Thus, the two recent industrial trends, i.e. becoming solutionist [7] and focusing on the core competence [31], rationally lead companies to seek an optimized space. By having such optimization, a provider can stay with its own core competence and, at the same time, a customer appreciates the necessity to “assemble” supplied products and services by themselves.

## 3 SPECIFICATIONS FOR SUPPORT METHODS NEEDED

The results, especially those described in Section 2.2, show that a set of different methods for IPSOs are needed. Methods are needed to be used by various functions within the IPSO supply chain in order to cover

various tasks (note that this does not mean that every single method should cover all the tasks). This is in line with existing literature, which argues that methods must be developed so that companies are supported upon designing IPSOs (e.g. [10]). This section discusses what kinds of features such methods should have, and the relative novelty of such methods.

### 3.1 Goals of the methods

As shown in this paper, IPSOs have a large impact on business aspects. Therefore, one type of such methods should support companies to develop their business models. Here, business development means identifying a set of values/costs over time, providers (suppliers), and properties of products/services. Those three elements exist in the level of *what*, *who* and *how*, respectively, if the four elements of service (*what*, *who*, *why*, and *how*) [33] are borrowed. Customers as a part of *who* and *why* are supposed to be given here, as companies do not regard identifying customers and the grounds for value/cost as a process that they strongly wish to be supported. Note that the properties of products/services are further utilized to design the physical products and service activities so that the entire body of information forms the *how*. *How* should include the information of e.g. spare parts (incl. supplied material), maintenance provided and expendable supplies.

### 3.2 When to use methods

The methods should support companies in two types of situations. Firstly, it should be helpful when companies investigate the feasibility of new types of business. Secondly, it should be powerful for companies to simulate quantitatively an offering to be proposed to a concerned customer.

This requirement is not contradictory to the goals described above; i.e., the methods with those goals can be utilized in these two types of situations.

### 3.3 How to represent value/cost

How should the value/cost, i.e. one element of the three described above, be represented? It should include *profit*, *turnover*, *cost*, and *risk* for the provider over time. Large companies might wish to know this economic information according to divisions in their company. That for the customer, on the other hand, should include qualitative representation of *customer value*, *cost*, and *risk* along time. Ownership of a physical product should be included in the customer value, since it is a key factor as explained previously. Furthermore, the degree of a provider's solution for the customer, which could be calculated from the customer value and *why* information, may be helpful. Uncertainty causing the risk should include that of condition of physical products, quality of services, delivery of sub-suppliers, and customer requirements. Let us assume that economy (including discount rate) and future laws are to be predicted due to the current focus.

### 3.4 Who should use the methods

IPSOs have influence on organisational structures of companies and may require a new structure. Thus, it is meaningless to discuss which one of the current sections in a company should use the methods. Therefore, this section discusses which functions of employees should be supported by the methods. One answer will be that the responsibility of using the methods should be attached to the marketing or sales function. Product development and after-sales (or service) sections should be a part of the users (i.e. contribute to utilize the methods). The reasons are that the information of products/services is addressed at a high level. Thus, the methods should work for internal communication.

Such methods would be useful for SMEs as well as large companies. The difference may exist in the focal parameters. SMEs might be more careful about the supplier's risk due to the relatively smaller risk that they can bear, while large companies might be conscious about the turnover in case they pursue leadership in the market.

### 3.5 New features of methods

The set of methods to be developed as a whole have new features, as they explicitly address some key parameters described in Section 2.2., for example:

- Feasibility of IPSO business.
- Access to physical products during the use phase.
- Control over spare parts.

On the other hand, there are various existing methods/tools that cover some of the needed features (e.g. [33-36]). These will potentially be a part of the set of methods.

## 4 CONCLUDING DISCUSSION

This paper attempted to illustrate business implications of IPSOs from supplier perspectives based on empirical experiences and previous research. It also highlighted several key strategic issues such as company flexibility, risks and opportunities of IPSOs, market positions, and contract types.

Then, based on key issues derived from the discussions, a set of methods was suggested, to be constructed to help companies with developing their IPSOs. The next step is further deployment of those features into more detailed descriptions, and development of the set of methods.

Results from the case studies show that both small and large companies that conduct the transition towards IPSOs face several important strategic challenges, some of them associated with high risk. There are also, as expected, apparent differences due to company size, both pros and cons for the larger and the smaller company. The results from the supplier studies thus also highlight important aspects for a customer-selecting provider of IPSOs.

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